

CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE CHEATHAM LAKE WATERSHED

- 5.1 Background**
- 5.2 Federal Partnerships**
 - 5.2.A. Natural Resources Conservation Service**
 - 5.2.B. United States Geological Survey**
 - 5.2.C. United States Fish and Wildlife Service**
 - 5.2.D. United States Army Corps of Engineers**
- 5.3 State Partnerships**
 - 5.3.A. TDEC Division of Water Supply**
 - 5.3.B. TDEC Clean Water State Revolving Fund Program**
 - 5.3.C. Tennessee Department of Agriculture**
 - 5.3.D. Tennessee Wildlife Resources Agency**
 - 5.3.E. Tennessee Stream Mitigation Program**
- 5.4 Local Initiatives**
 - 5.4.A. The Cumberland River Compact**
 - 5.4.B. Central Basin RC&D Council**
 - 5.4.C. Five Rivers RC&D Council**

5.1. BACKGROUND. The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Cheatham Lake Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS

5.2.A. Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at <http://prms.nrcs.usda.gov/prs>. From the opening menu, select "Reports" in the top tool bar. You will select the time period that you are interested in and the conservation treatment of interest on the page that comes up. Depending on the time period of interest, you will have various report options to choose from, such as location, reporting period and program involved in the reporting. You may be required to "refresh" the page in order to get the current report to come up.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

Conservation Practice	Feet	Acres	Number
Conservation Buffers	22,511	47	
Erosion Control		1345	
Nutrient Management		6508	
Pest Management		5187	
Grazing / Forages	37287	4256	
Tree and Shrub Practices		2203	
Tillage and Cropping		2498	
Wetlands		7	
Wildlife Habitat Management		2292	
Water Supply	12	3450	
Waste Management Systems			5

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Cheatham Lake Watershed. Data are from PRMS for October 1, 2002 through September 30, 2006, reporting period. More information is provided in Appendix V.

5.2.B. United States Geological Survey – Tennessee Water Science Center Programs.

The United States Geological Survey (USGS) provides relevant and objective scientific information and data for public use in evaluation of the quantity, quality, and use of the Nation's water resources. National USGS water resource assessments include the National Streamflow Information Program (<http://water.usgs.gov/nsip/>), National Atmospheric Deposition Network (<http://bqs.usgs.gov/acidrain/>), the National Stream Quality Accounting Network (<http://water.usgs.gov/nasqan/>), and the National Water Quality Assessment Program (<http://water.usgs.gov/nawqa/>). For a national overview of USGS water resources programs, please visit <http://water.usgs.gov>.

In addition to national assessments, the USGS also conducts hydrologic investigations and data collection in cooperation with numerous federal, state, and local agencies to address issues of national, regional, and local concern. Hydrologic investigations conducted by the USGS Tennessee Water Science Center address scientific questions pertaining to five general thematic topics:

1. Water Use and Availability,
2. Landforms and Ecology,
3. Watersheds and Land Use,
4. Occurrence, Fate, and Transport of Contaminants,
5. Floods and Droughts.

In support of these investigations, the USGS Tennessee Water Science Center records streamflow continuously at more than 100 gaging stations, makes instantaneous measurements of streamflow at numerous other locations as needed or requested, monitors ground-water levels statewide, and analyzes the physical, chemical, and biologic characteristics of surface and ground waters. In addition, the Water Science Center compiles annual water-use records for the State of Tennessee and collects a variety of data in support of national USGS baseline and other networks. More information pertaining to USGS activities in Tennessee can be accessed at <http://tn.water.usgs.gov>.

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water-level, and water-quality data at sites operated by the USGS Tennessee Water Science Center can be accessed on-line at <http://waterdata.usgs.gov/tn/nwis/nwis>. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus on the web page. For specific information or questions about USGS streamflow data, contact Donna Flohr at (615)837-4730 or dfflohr@usgs.gov. Recent USGS Tennessee Water Science Center publications can be accessed by visiting <http://tn.water.usgs.gov/pubpg.html>. A searchable bibliographic database is also provided for locating other USGS reports and products addressing specific scientific topics.

5.2.C. U.S. Fish and Wildlife Service.

The mission of the U.S. Fish and Wildlife Service is working with partners to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with state and federal agencies and tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to states for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program

Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming, or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but also other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

In a partnership with The Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Areas, the Service developed a State Conservation Agreement for Cave Dependent Species in Tennessee (SCA). The SCA targets unlisted but rare species and protects these species through a suite of proactive conservation agreements. The goal is to preclude the need to list these species under the ESA. This agreement covers middle Tennessee and will benefit water quality in many watersheds within the State.

The following federally endangered (E), threatened (T), and candidate (C) species occur in the Lower Cumberland River (Cheatham Lake) Watershed: bald eagle (*Haliaeetus leucocephalus*) (T); insular cave beetle (*Pseudanophthalmus insularis*) (C); Nashville crayfish (*Orconectes shoupi*) (E); leafy prairie-clover (*Dalea foliosa*) (E); Price's potato-bean (*Apios priceana*) (T); Short's bladderpod (*Lesquerella globosa*) (C); and Cumberlandian combshell (*Epioblasma brevidens*) (E). Eggert's sunflower (*Helianthus eggertii*) (T) was formally removed from the list of federally endangered and threatened species in September, 2005. Populations will be monitored for five years. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at <http://www.fws.gov/cookeville/>

Partners for Fish and Wildlife Program

The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types that benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

HOW TO PARTICIPATE...

- Interested landowners contact a Partners for Fish and Wildlife Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.
- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service's Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.

- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Cookeville Ecological Services Field Office at 931/528-6481 or visit their website at <http://www.fws.gov/cookeville/>.

5.2.D. United States Army Corps of Engineers-Nashville District. The Nashville District, U.S. Army Corps of Engineers is one of seven districts in the Lakes and Rivers Division. The district's area is determined by the Cumberland River and the Tennessee River's watersheds and encompasses 59,000 square miles in portions of seven states. This geographic area is represented by 14 senators and 20 Congressional representatives. The Nashville District's missions include providing flood protection, recreation, hydropower, and navigation. The District also provides environmental stewardship through our Regulatory and Civil Works programs, conducts emergency response to disasters, and to performs other authorized Civil Works projects.

Within the 18,000 square mile Cumberland River Basin, overall responsibilities for the Nashville District include operation and maintenance of 10 reservoir projects. Each of these is operated for some or all of the following purposes: hydropower production, flood control, navigation, water supply, water quality, fish and wildlife, and recreation.

Regulatory Program

The U.S. Army Corps of Engineers has been involved in regulating certain activities in the nation's water since 1890. Prior to 1968, the primary thrust for the regulatory program was the protection of navigation. As a result of new laws and judicial decisions, the program has evolved to one that considers the full public interest by balancing the favorable impacts against detrimental impacts. The Nashville District annually handles more than 3,000 regulatory actions, 97% of which were evaluated in less than 60 days.

Section 10 of the Rivers and Harbors Act of 1899 - requires approval prior to the accomplishment of any work in or over navigable waters of the United States, or which affects the course, location, condition or capacity of such waters. Typical activities requiring Section 10 permits are:

- Construction of piers, wharves, bulkheads, dolphins, marinas, ramps, and cable/pipeline crossings.
- Dredging and excavation

Section 404 of the Clean Water Act - requires approval prior to discharging dredged or fill material into the waters of the United States. Typical activities requiring Section 404 permits are:

- Depositing of fill or dredged material in waters of the U.S. or adjacent wetlands.
- Site development fill for residential, commercial, or recreational developments.
- Construction of revetments, breakwaters, levees, dams, dikes, and weirs.
- Placement of riprap and road fills.

Civil Works Program

The Corps' ongoing Civil Works responsibilities date back to the early 1800's when Congress authorized the removal of navigation hazards and obstacles. Over the years, succeeding Administrations and Congresses have expanded the Corps' missions to include most all water-related planning, development, and construction areas where a Federal interest is involved. Funds for Congressionally Authorized Projects are provided through Energy and Water Appropriations Acts and through contributions from non-Federal entities for specific projects.

Civil Works projects may also be funded under the Continuing Authorities Program (CAP). Congress has provided the Corps with standing authorities to study and build specific water resources projects for specific purposes and with specified spending limits. CAP projects are usually implemented in a faster time frame, are limited in complexity, have Federal cost limits, are approved by the Division Commander, and do not need Congressional authorization.

Environmental Education

Environmental education opportunities are provided to area school age children by the Nashville District Corps of Engineers. Water Quality personnel have participated in environmental awareness programs for the past several years at the majority of Nashville District lakes. These programs are organized by the local lake Resource Management staff and involve various area schools. The programs provided allow students to have a "hands on" experience in water quality surveillance techniques. Typically the programs include an interactive discussion of overall water quality issues. This is supplemented with demonstrations of sophisticated water quality instrumentation, collection and analysis of biological specimens from local aquatic environments, and viewing of reference materials and preserved specimens. The value of such environmental education is enormous, because it reaches young people early in their lives and exposes them to a scientific learning experience that is impossible to duplicate in a formal classroom. This experience hopefully contributes to a greater lifelong awareness by the individual of the importance of conserving and improving water quality and wise use of water resources.

Nashville District Corps of Engineers Water Quality Program

The Nashville District Corps of Engineers collects a significant volume of physical, chemical, and biological water quality data every year. These data are collected at representative points both within all ten Nashville District lakes, on various major and/or representative inflow streams, and in the tailwaters. Where there are known water quality problems, such as seasonal low DO in certain turbine releases, monitoring is significantly intensified to track and quantify a particular problem. This information is used to make informed decisions about how a project's powerplant should operate.

Baseline, continuous recording, multiparameter water quality monitors keep track of conditions at critical points on the main stem of the Cumberland River from the mouth of the Obey River near Celina, Tennessee to the tailwater of Lake Barkley in western Kentucky. The monitor at the Old Hickory Dam tailwater, in particular, provides key information, since water discharged from Old Hickory must be able to absorb inputs from Nashville, which is just downstream.

The data collected by the Nashville District are used to help determine watershed water quality trends and to provide for better management of the comprehensive reservoir system. The data are essential for running predictive water quality models, a growing trend in Corps' water management practice.

Additional information concerning projects, programs, and activities of the Nashville District Corps of Engineers can be obtained on the World Wide Web at <http://www.lrn.usace.army.mil/>

WATER QUALITY ISSUES AND HIGHLIGHTS OF ACTIONS AND INITIATIVES IN THE CUMBERLAND RIVER WATERSHED

Dam Safety Issues and Water Management/Quality Consequences

Besides environmental concerns in the immediate reservoir and tailwater environments of two projects, Wolf Creek and Center Hill Lake Dam restorations. Downstream needs may be even more critical within two downstream Group Five Watersheds, Cheatham Lake and Lake Barkley. In one of these, the Cumberland River or Cheatham Lake below Old Hickory Dam (CRM 216.2), the consequences of reduced flows in the Cumberland River above Old Hickory Dam may cause lower than normal DO levels in the Old Hickory Dam outflow. In order to maintain at least the warm water standard for DO of 5.0 mg/l, hydropower production may be foregone or reduced at times in favor of spilling water over the dam in order to provide additional aeration. By meeting the DO target at the Old Hickory Dam tailwater, it is likely downstream wastewater assimilative needs will be satisfied and the river environment protected.

Below, Cheatham Dam (CRM 148.7) further water management challenges continue. Here, water management will focus on keeping the critically important TVA coal fired, Cumberland City generating plant functioning by providing adequate cooling water.

Information about reservoir and river conditions is key to long-term system management. Additional and more intensive water quality monitoring by the Nashville District has already gotten underway at several of the Nashville District's storage reservoirs in order to better define conditions prior to the critical low flow season. This monitoring data is vital for the day-to-day and long-term operation of the river system while the dam repairs proceed.

In summary, challenges to maintaining the water quality of the Cumberland River System are significantly more complicated than normal due to the vast reduction of water normally held in storage, the uncertainty of antecedent meteorological events, and

multiyear time scale for repairs to the dams. Each year will represent a new set of circumstances until the compromised reservoir projects can return to normal operations.

Mill Creek Watershed (Davidson County)

The Nashville District is conducting a study of the lower 2/3 of the Mill Creek Watershed within the jurisdiction of the study sponsor, Metropolitan Government of Nashville and Davidson County. The study evaluates both water quantity and water quality issues as defined by flood damage and aquatic ecosystem problems. A major goal of the study has been to evaluate the impacts of urbanization on water quantity and quality and to develop GIS-based management tools that Metro Nashville can use to manage growth. Ecosystem restoration alternatives include riparian plantings, wetland creation, rain gardens, stream bank protection and in stream habitat structures; greenways/parks will also be included along with both ecosystem restoration and flood damage reduction purposes. A standard suite of flood damage reduction alternatives is being considered, with floodplain evacuation, bridge and channel modifications and a dry dam surviving the initial screening.

Nashville Riverfront, Nashville, TN

The Nashville District completed a master plan presenting a comprehensive redevelopment plan for the Cumberland Riverfront in downtown Nashville in Feb 07 under the Planning Assistance to States (PAS) program. The Nashville Riverfront Redevelopment Plan calls for expanded parks, trails, water recreation and environmental restoration with both residential and commercial opportunities in the heart of Nashville. The benefits of reinventing the riverfront include economic development with private investment over \$1.4 billion, environmental clean up of over 190 acres of degraded land with new "green" development, and providing a culturally significant place to celebrate, recreate and learn. The Mayor of Metropolitan Nashville and Davidson County included \$8 million in the city's upcoming budget and is hiring a full time riverfront redevelopment director.

Additional Information

To obtain additional information about the District, please refer to the home page at:

<http://www.lrn.usace.army.mil/>, or contact the following offices:

Public Affairs Office (General Information): (615) 736-7161

Regulatory Branch: (615) 369-7500

5.3. STATE PARTNERSHIPS

5.3.A. TDEC Division of Water Supply. The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

- 1) Delineate the drinking water source protection area
- 2) Inventory known and potential sources of contamination within these areas
- 3) Determine the susceptibility of the water supply system to these contaminants
- 4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
- 5) Implement management measures to prevent, reduce or eliminate threats
- 6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst (limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and springs), since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions were available until 2004). The assessments are intended to enhance the protection of drinking water supplies

within existing programs at the federal, state and local levels. Source water assessments were mandated and funded by Congress. Source water protection will be left up to the individual states and local governments without additional authority from Congress for that progression.

Tennessee's Wellhead Protection Rules were revised as of October 29, 2005 to include requirements for similar protection for public water systems using surface water sources under the heading of Drinking Water Source Protection Rule (1200-5-1-.34) in addition to the previous requirements for wellhead protection for public water systems using ground water sources. The rule addresses surface or ground water withdrawals in the vicinity of public water sources as well as potential contaminant sources threatening public water sources to reflect the amended prohibitions in the 2002 Amendments to the Tennessee Safe Drinking Water Act, TCA 68-221-771. There are additional reporting requirements of potential contaminant source inventories and emergency response for the public water systems as well. The Division of Water Supply will be able to use the Drinking Water Source Protection Rule to work in complimentary fashion with the Division of Water Pollution Control and other Departmental agencies in activities to protect public water sources.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at:

<http://www.state.tn.us/environment/dws> as well as other information regarding the Source Water Assessment Program and public water systems.

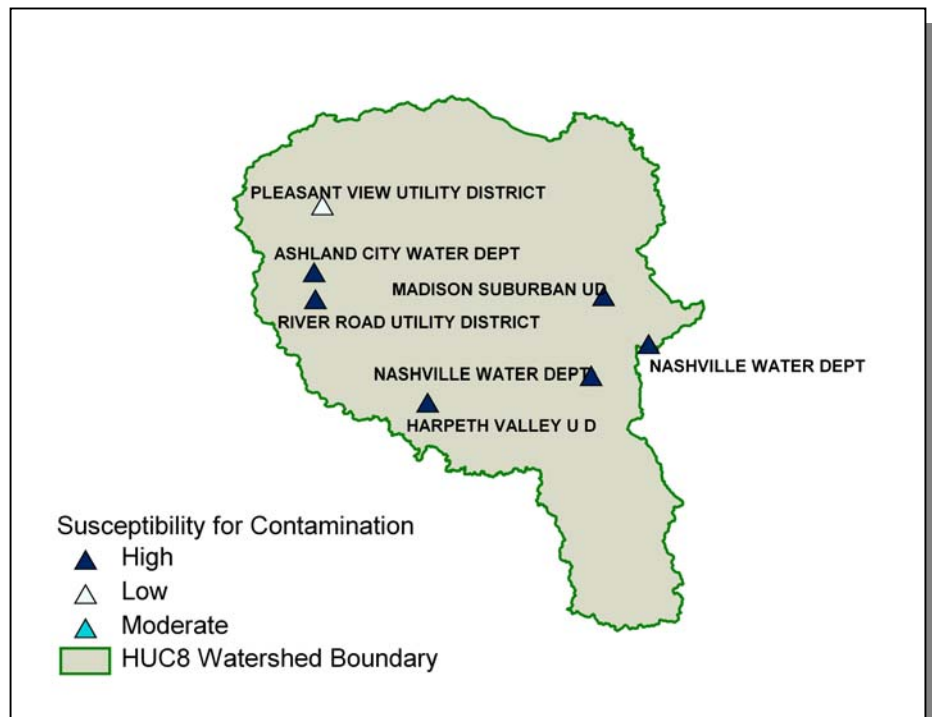


Figure 5-1. Public Water Systems Susceptible to Contamination in the Cheatham Lake Watershed.

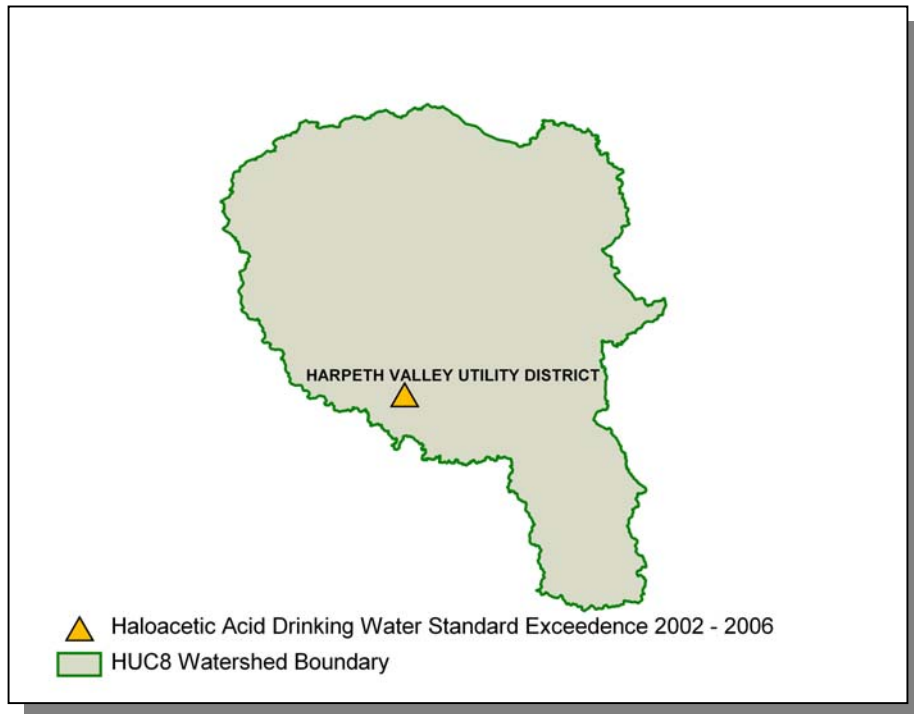


Figure 5-2. Exceedences of the Haloacetic Acid Drinking Water Standard in the Cheatham Lake Watershed.

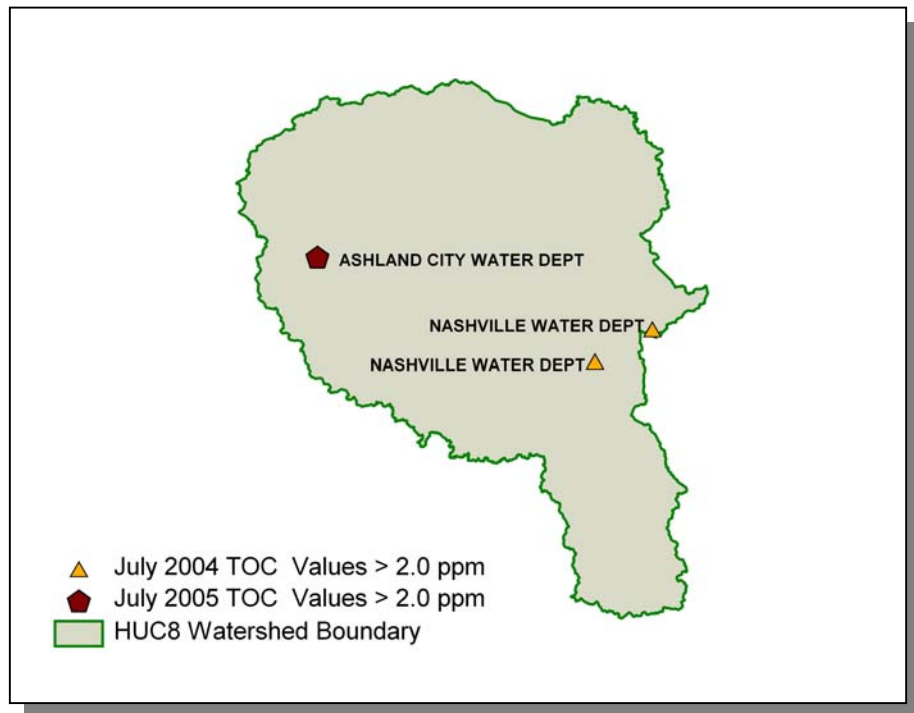


Figure 5-3. July 2004 and 2005 Raw Water Total Organic Carbon (TOC) Analysis in the Cheatham Lake Watershed.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at:

<http://state.tn.us/environment/dws/pdf/2006gw305b.pdf>

5.3.B. TDEC State Revolving Fund Program. The Division of Water Pollution Control and the Division of Water Supply jointly administer the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. TDEC has awarded loans totaling over \$675 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility - whichever is shorter.

The SRF Program maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

Communities in the Tennessee Portion of the Pigeon River Watershed that have received Clean Water State Revolving Fund Grants or Loans since the inception of the program are listed in Appendix V. For further information about Tennessee's Clean Water SRF Loan Program, contact the Clean Water SRF Loan Program by telephone at (615) 532-0445 or visit their Web site at <http://tennessee.gov/environment/srf>.

5.3.C. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section administers the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- **BMP Implementation Projects.** These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.
- **Monitoring Projects.** Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Cheatham Lake Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreement C99944674-04-0 and C99944674-05-0).
- **Educational Projects.** The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development

Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information forestry BMPs is available at:

<http://www.state.tn.us/agriculture/forestry/bmpmanual.html>

The complaint form is available at:

http://www.state.tn.us/environment/wpc/forms/wqlogging_cn1274.doc

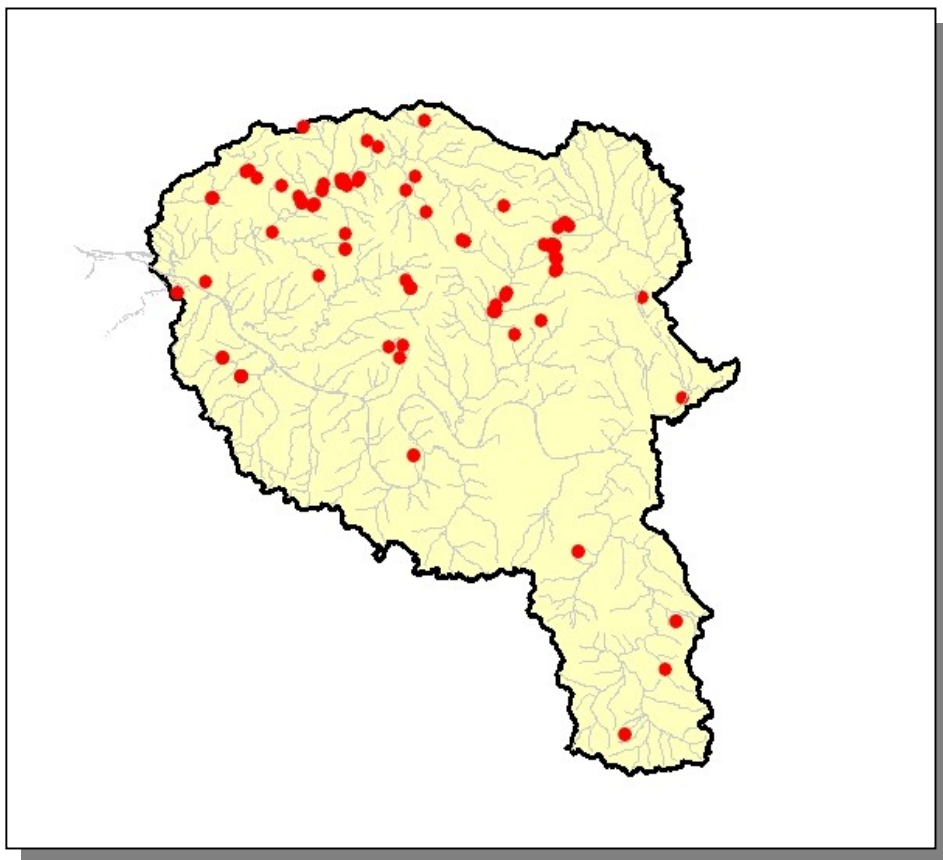


Figure 5-4. Location of BMPs installed from 2002 through 2006 in the Cheatham Lake Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. More information is provided in Appendix V.

5.3.D. Tennessee Wildlife Resources Agency. The Tennessee Wildlife Resources Agency (TWRA) conducts a variety of activities related to watershed conservation and management. Fish management activities include documentation of fish and aquatic life through stream sampling and stocking of both warm water and cold-water sport fish. Fish data are managed in the Geographic Information System (GIS) project called Tennessee Aquatic Database System (TADS). TWRA nongame and endangered species projects include restoration of special status fish, aquatic life, and riparian wildlife. The Agency conducts a variety of freshwater mussel management, conservation, and restoration projects including the propagation and reintroduction of species once common in Tennessee streams. TWRA has been involved in riparian conservation projects since 1991 in partnership with state and federal agencies and conservation groups.

The Tennessee Aquatic Database System (TADS)

The Tennessee Aquatic Database System (TADS) originated in the mid-1980's as a geographically referenced fisheries database maintained with ESRI's GIS Arc/Info software. It consists of mapping coverages of streams, rivers and reservoirs along with relatable fisheries data files. These database files include stream and river fish distributions, sample site data, and Index of Biotic Integrity (IBI) data. The fish inventory data file contains over 15,000 records of fish occurrences from over 3,600 sample sites across the state. Fish data is referenced by river reach and a point coverage generated by latitude and longitude. Physical and chemical data and habitat evaluations from most of the sample sites have been entered into a database.

TWRA Fisheries stream survey data were consolidated, updated and entered into a Microsoft Access database to create the Tennessee Aquatic Database System 07 (TADS07), an updated version of the TADS. TADS07 contains fisheries stream survey data from 1987 to 2005.

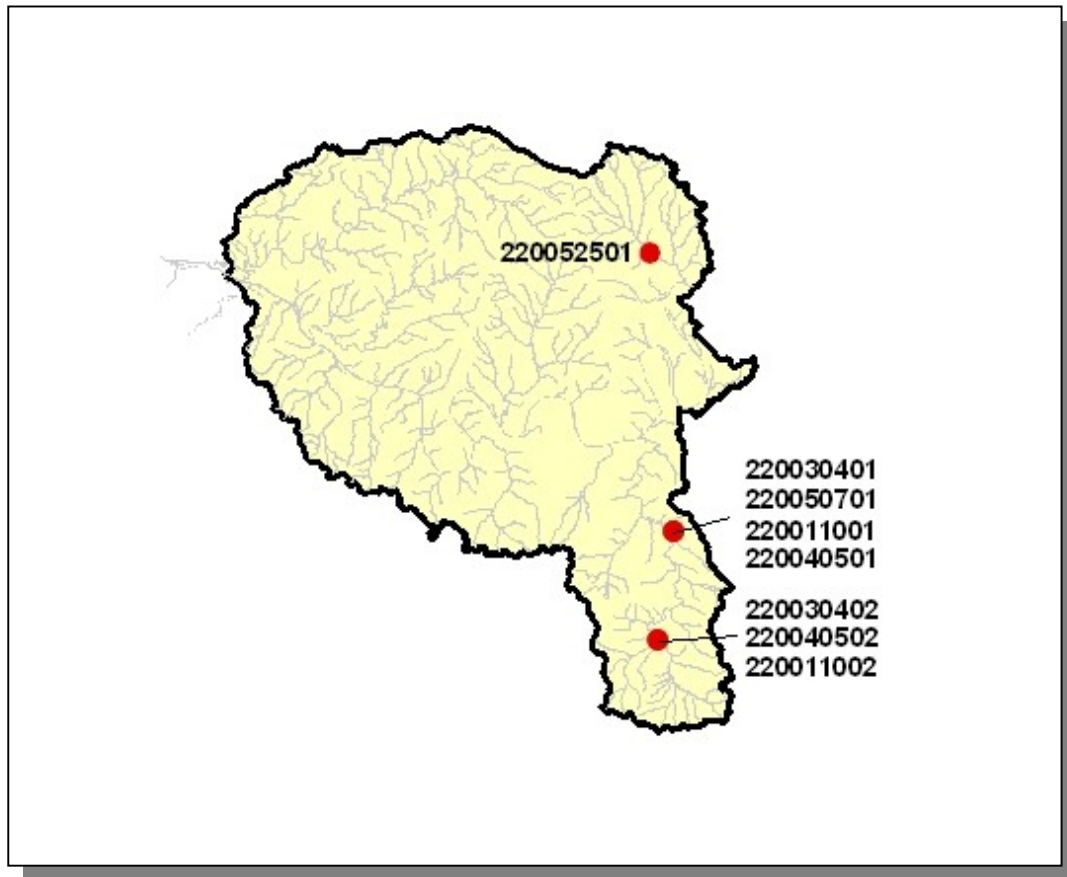


Figure 5-9. Location of TWRA TADS Sampling Sites in the Cheatham Lake Watershed from 1987-2005. More information is provided in Appendix V.

Tennessee State Wildlife Action Plan (SWAP)

The Tennessee State Wildlife Action Plan (SWAP), formerly known as the Comprehensive Wildlife Conservation Strategy (CWCS), was developed by the Tennessee Wildlife Resources Agency with assistance from The Nature Conservancy in 2005. Congress mandated that each state and territory in the United States develop a SWAP as a requirement for continued receipt of federal State Wildlife Grant funding. These plans require the completion of 8 key elements of wildlife planning: 1) a list of animal species of greatest conservation need, 2) information about the distribution and abundance of species targets, 3) locations and relative conditions of key habitats, 4) descriptions of problems affecting target species and their habitats, 5) descriptions of conservation actions and priorities for conserving target species and habitats, 6) details for monitoring target species, conservation actions, and adaptive management, 7) discussion of plans to review the SWAP at specific intervals, and 8) information about coordination and implementation of the SWAP with major stakeholders. In Tennessee, the SWAP was integrated into a spatial model using Geographic Information Systems (GIS) and other database technology. Priority aquatic, terrestrial, and subterranean areas for conservation were identified across the state. Priorities were determined in the

GIS model based upon relative differences in species rarity, population viability, and potential mobility of species across habitat units.

Priority problems affecting species and needed conservation actions are detailed across each region of the state. For complete information about the Tennessee SWAP, please visit: <http://www.state.tn.us/twra/cwcs/cwcsindex.html> to read or download the full report.

For information on these and other water resources related activities, please contact your Regional TWRA office at the following phone numbers:

West Tennessee (Region I)	1-800-372-3928
Middle Tennessee (Region II)	1-800-624-7406
Cumberland Plateau (Region III)	1-800-262-6704
East Tennessee (Region IV)	1-800-332-0900

TDD services are available at 615-781-6691.

TWRA's website is <http://www.state.tn.us/twra>.

5.3.E. Tennessee Stream Mitigation Program The Tennessee Stream Mitigation Program (TSMP) was established as Tennessee's first in-lieu-fee program under the Tennessee Wildlife Resources Foundation in 2003. Since its inception the program has made great strides to provide compensatory mitigation to offset stream impacts associated with §404/401 water quality permits. The TSMP is committed to providing meaningful mitigation on degraded streams to improve in-stream and riparian habitat and overall water quality. Employing principles of natural channel design and process-based methodologies, the TSMP continues to identify and develop restoration and enhancement projects across the state. In accordance with the *Tennessee Stream Mitigation Guidelines* and the TWRF MOA, the TSMP develops large-scale projects based on a watershed approach, giving priority to streams listed on the 303(d) list for physical habitat impairments.

Strategic partnerships with state and federal agencies, municipalities, and nonprofit environmental organizations, allows the TSMP to provide funding for on-going watershed initiatives through stream restoration. The TSMP can fund 100% of the costs associated with the design and implementation of restoration projects on private or public lands. For more information on the program visit the TSMP website at <http://tsmp.us/TSMP/Home.html>

Tennessee Stream Mitigation Program Restoration Project #1

Sevenmile Creek Stream Enhancement Project, Davidson County, Tennessee



Watershed:	Cheatham Lake
Ecoregion:	Interior Plateau
Project Length:	3,900 linear feet
Mitigation Treatment:	Restoration, Enhancement II
Est. Credits Produced:	1,467
Est. Completion Date:	January 2007

Project Description:

The primary objectives of the project will be to stabilize channel banks; enhance the riparian zone through invasive species management and native re-vegetation; and create floodplain basins to filter flood flows and storm water from adjoining properties. Sevenmile Creek in the project area has increased runoff due to urban development, causing the stream to incise where possible and to widen. In-channel habitat in the project area is limited to localized irregularities in the limestone bed and exposed rock plates. Sevenmile Creek has been listed on the 303(d) list due to impacts from storm water discharges and hydro-modification. In addition, it provides habitat for the federally-listed Nashville Crayfish (*Orconectes shoupi*). Re-grading and planting of unstable banks will reduce erosion and improve water quality. The restored riparian buffer will decrease stream temperatures and provide habitat for terrestrial animals. The floodplain basins will help improve water quality, decrease peak flows in Sevenmile Creek, and provide valuable floodplain habitat.

Key Elements of Project:

- Stream Restoration
- Stream Enhancement
- Bankfull bench, flood-prone area excavation
- In-stream habitat enhancement
- Native riparian buffer establishment
- Permanent Land Preservation Agreement
- Invasive plant species control

Tennessee Stream Mitigation Program Restoration Project #2

Pavillion Branch Stream Restoration Project, Davidson County, Tennessee



Watershed:	Cheatham Lake
Ecoregion:	Interior Plateau
Project Length:	5,510 linear feet
Mitigation Treatment:	Restoration
Est. Credits Produced:	4,006
Est. Completion Date:	March 2007

Project Description:

The project is located at the Tennessee Preparatory School Complex owned by the State of Tennessee in Nashville and contains the headwaters of Pavillion Branch. The primary objectives of the project are to re-establish in-stream habitat by restoring bedform diversity in the form of pools and riffles, enhancing the ability of the site to filter municipal stormwater by utilizing constructed best management practices, and establishing a protected riparian corridor planted with native vegetation adjacent to each of the project streams. Pavillion Branch has been listed as impaired due to pathogens from MS4 discharge sources. This project provides a rare opportunity to complete larger scale stream restoration in an urban landscape, especially in the Mill Creek watershed. The majority of the system was channelized and armored with slab rock in the mid 1900's. The existing riparian community at Pavilion Branch is sparse and consists mostly of non-native woody vegetation. The potential also exists to provide suitable Nashville crayfish habitat through enhanced habitat structure.

Key Elements of Project:

- Priority 2 & 3 stream channel restoration
- In-stream habitat enhancement
- New channel construction
- Native riparian buffer establishment
- Improve water quality
- Perpetual Conservation Easement

5.4. LOCAL INITIATIVES.

5.4.A. The Cumberland River Compact. The mission of the Cumberland River Compact is to enhance the water quality of the Cumberland River and its tributaries through education and by promoting cooperation among citizens, businesses, and agencies in Kentucky and Tennessee.

We are a unique non-profit group that believes we can have both a strong economy and a healthy environment. The Compact is made up of businesses, individuals, community organizations and agencies working in the Cumberland River Watershed. Over 2 million people share this watershed. Compact members work with all interested organizations and individuals to help ensure that our rivers and streams continue to provide us with clean water, bountiful crops, healthy fisheries and abundant recreational opportunities.

Since 1997, the Compact has set out to create a Watershed Outreach Program in each of the 14 watersheds that make up the Cumberland Basin. Members and staff of the Compact work with local communities to develop watershed forums where citizens can come together to learn more about their watershed and participate in developing a shared vision for the future. We welcome your interest and participation in this challenging project.

In the Lower Cumberland River (Cheatham Lake) watershed, the Compact is beginning Project Blue Stream (PBS) in 2007, which will focus on the restoration of streams within the Nashville and Lower Cumberland River region. Project Blue Stream aims to enhance the overall quality of the streams within the Lower Cumberland River watershed by increasing awareness of individual actions/behaviors and their effect on local streams. Through a watershed-based plan, PBS will work to enhance the health of Nashville's Mid-Cumberland Watershed with a model neighborhood stream restoration and protection program that combines public education, low impact development interventions, and local officials educational outreach.

Mid-Cumberland Watershed Coalition The MCWC started in August of 2003 with the help of a grant from Cumberland River Compact. A little over a year ago instead of forming a non-profit organization, MCWC decided to change their name to Mid-Cumberland Watershed Committee and become part of the Compact in order to use their already established non-profit status. The MCWC covers the area within the Lower Cumberland that includes many of the streams and rivers within Davidson and Cheatham Counties between the Old Hickory Dam and the Cheatham Dam. MCWC conducts stream cleanups, operates a booth at the Earth Day Festival, participates in the Catfish Rodeo, and hopes to provide volunteers for the Compact's Project Blue Streams stream restoration projects. MCWC also conducts quarterly educational programs. In collaboration with the Compact's Water Quality Advisory Committee, MCWC developed the Mid-Cumberland Watershed Map that depicts water quality concerns based on the 2004 303(d) report from TDEC.

For more information on the Mid Cumberland Watershed Committee, please contact the MCWC Chairman, Art Newby, at 615-642-1406 or art.newby@cte.aecom.com

For more information about the Cumberland River Compact and to learn more about your local watershed, contact the Compact at info@cumberlandrivercompact.org; 615-837-1151 or join us on the web at <http://www.cumberlandrivercompact.org>.

5.4.B. Central Basin RC&D Council. The Mission of the Central Basin Resource Conservation & Development Council is to promote the wise utilization of natural, cultural and other resources creating managed and sustainable growth that will improve the overall quality of life.

The Central Basin RC&D area covers six counties in Middle Tennessee: Davidson, Rutherford, Sumner, Trousdale, Williamson and Wilson. The name is derived from the geologic formation known as the Central or Nashville Basin that encompasses the majority of the area.

The RC&D program is administered by the USDA Natural Resources Conservation Service and directed at the local level by the RC&D Council, which is a 501(c)(3) organization. Secretary of Agriculture Ann Veneman designated the Central Basin RC&D Area in January 2002.

The Central Basin RC&D is currently looking for opportunities for habitat enhancement and protection within the Mill Creek watershed, a tributary to Cheatham reservoir. To date, Central Basin has completed two projects within this watershed consisting of a livestock operation and an urban demonstration site. The livestock project included riparian exclusional fencing, grade stabilization structures and constructed stream crossings. The urban project consisted of riparian vegetation establishment and informational media. Financial assistance for these projects has been provided by a grant from the U.S. Fish and Wildlife Service and is targeted at the enhancement and protection of habitat for the Nashville Crayfish (*Orconectes shoupii*). Additional funding is still available for projects that have a positive impact on water quality within the Mill Creek watershed.

For more information on the Central Basin RC&D Council and its programs, contact Allen Persinger, RC&D Coordinator at (615) 444-1890 ext. 110 or allen.persinger@tn.usda.gov.

5.4.C. Five Rivers RC&D Council The mission of the Five Rivers RC&D Council is to promote activities that will enhance the quality of life, conserve natural resources, and promote economic development in the council area.

The Five Rivers RC&D Council covers seven (7) counties in Middle Tennessee. Named for the 5 major rivers following through the area, the Council serves Cheatham, Dickson, Houston, Humphreys, Montgomery, Robertson and Stewart Counties. With the natural resources and community activities being diverse in geography, the Council responds to the needs of their local communities, both for conservation issues and for economic and rural development. The collaboration of its numerous partners makes the Five Rivers RC&D Council area distinctive.

The Five Rivers RC&D Council assists in administering the USDA Resource Conservation and Development Program, which is a unique combination of private enterprise and federal assistance that encourages economic growth through development, conservation, and planned utilization of natural resources across the council area and Tennessee. Just a few services the RC&D Program is providing in our community are Conservation Education, Farmland Protection, providing Technical Assistance, ensuring Community Services, establishing Sustainable Development, encouraging Natural Resource Protection, and Communicating Local Issues.

The Five Rivers RC&D Council is worked with landowners in the Cheatham Lake watershed in Cheatham and Robertson Counties to demonstrate solutions to sedimentation and non-point source pollution loading by installing Best Management Practices along sensitive stream segments. Assisting the Natural Resources Conservation Service local Soil Conservation Districts in developing conservation plans to include new techniques for stream crossing and watering the livestock animals, has proven to be critical to influencing adjacent landowners.

The environmental problems addressed within the watershed were caused by severe streambank erosion from changes in the stream channels, livestock accessibility to these streams, a lack of buffer and riparian zones, and some improper farming techniques that have impaired the stream systems.

Some of the management practices include solar ram pumps for watering troughs to provide fresh clean water supplies for cattle and fences to exclude livestock from access to ponds or adjacent stream. The landowners used geo-textile fabrics and bioengineering to restore streambanks and to provide protection against future river swells. The stabilization of the slopes allowed the landowners to establish a stream crossing for farm and heavy equipment to gain access to secluded portions of their property. Landowners reduced sedimentation by improving their pasture lands and providing intensive rotational grazing systems to adequately feed forages and maintain healthy open lands. The improved varieties of grass were better suited for Middle Tennessee's drier conditions. The opportunity to establish some native warm season grass plots for wildlife habitat was made possible through some USDA farm programs.

The use of farm implements such as no till drills, have improved over 2,300 acres in Cheatham and Robertson counties - more than 60 landowners in 2006 are now using these. The numerous projects installed total over \$107,000 in addition to improving the water quality along the Lower Cumberland-Cheatham Lake Watershed, the aquatic habitat remains intact and the rare native plants have a better environment to flourish. The knowledge carried on by these landowners speaks volumes to their neighbors, ensuring the rest of the farming community grasped these conservation concepts for their own benefit and for the benefit of generations to come.

For more information on the Five Rivers RC&D Council and its programs, contact Chandra B. Owens, NRCS-RC&D Coordinator at (931) 368-0252 ext. 5 or visit the web site <http://www.FiveRiversRCD.org>.